

ALTERNATOR, REGULATOR, BATTERY & STARTER TESTER



INSTRUCTION MANUAL

P/N 533347

IMPORTANT NOTICE

SAFETY

All Danger, Warning and Caution messages must be followed for your safety. These safety messages will be preceded by icons displayed in the following formats:



This icon means you may risk possible loss of life.



This icon means you may risk bodily harm.



This icon means you risk damage to the vehicle or the tool.

These safety messages cover situations Bosch is aware of. Bosch cannot know, evaluate and advise you as to all of the possible hazards. You must be certain that your personal safety is not jeopardized by any conditions or service procedures encountered. In addition to the safety messages:



This icon precedes notes that are added to provide clarity and helpful tips.

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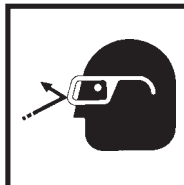
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Safety



Warning

- Stand back from the battery during testing. Automotive batteries contain sulfuric acid and can produce explosive gases that may result in serious injury. To prevent ignition of gases, keep lighted tobacco, sparks, flames, and other ignition sources away from the battery at all times.
- Do not attempt to test a frozen battery, it may explode. Allow the battery to warm up to 60° F before attempting any testing.
- Do not spray any liquids on the battery tester. Liquids may enter the tester and cause permanent damage to the electrical components. Flammable liquids may cause an explosion.
- Wear an American National Standards Institute (ANSI) approved eye shield when testing batteries. Provide ventilation and have water available for flushing in case any battery acid should splash on you.
- Do not touch the vent located at the rear of the tester. Excess heat given off during the battery testing procedure can make this surface very hot.
- Do not remove any leads while the battery test is running. If a lead must be removed during a test, turn the battery tester off by pressing the OFF button or any tester key to end the test.



Caution

- To prevent ruining the vehicle computer when disconnecting battery cables:
 1. Turn the ignition, all accessories and loads OFF. Close the vehicle doors and trunk lid.
 2. Remove the negative (-) battery cable first; then remove the positive (+) cable.
- This tester is designed to test 6- and 12-volt automotive batteries rated at 100 CCA or higher. Do not test small 6- or 12-volt batteries.
- The battery charger supplied with this tester is the only battery charger to be used to charge the tester internal battery. Use of any other charger will void the warranty, may damage the tester and may cause a fire.
- Do not charge the battery for more than 24 hours. Overcharging will damage the battery and the charger.
- The tester is supplied with either a battery charger designed for use with 110-volt, 60Hz power or a charger designed for 230-volt, 50Hz power. Use the charger only with the voltage for which it is rated. Failure to do so will damage the charger and void the warranty.
- Do not leave the tester for prolonged periods in direct sunlight. This causes the display to dim due to excess heat.

Read Me First

Before starting work with your battery tester, there are a couple of tasks you must do immediately. First of all, unpack your battery tester but **keep the shipping carton and packing material**. Should warranty or any other repair become necessary, it is important that the unit be packed securely in its original, or an equivalent, shipping carton and packing material.

The second task you must do is **charge the battery tester's internal battery**: you may use the charger as a source of supplemental power for the battery tester during testing, if necessary. Plug the supplied battery charger into an electrical outlet (110-volt or 230-volt, depending on the rating of the charger). Plug the charger cable connector into the charger receptacle. Refer to figure 1. The battery will be fully charged in 12 - 24 hours.



Do not charge the battery for more than 24 hours.

The battery tester will display an alert message when the internal battery power is low and it is necessary to recharge the internal battery.

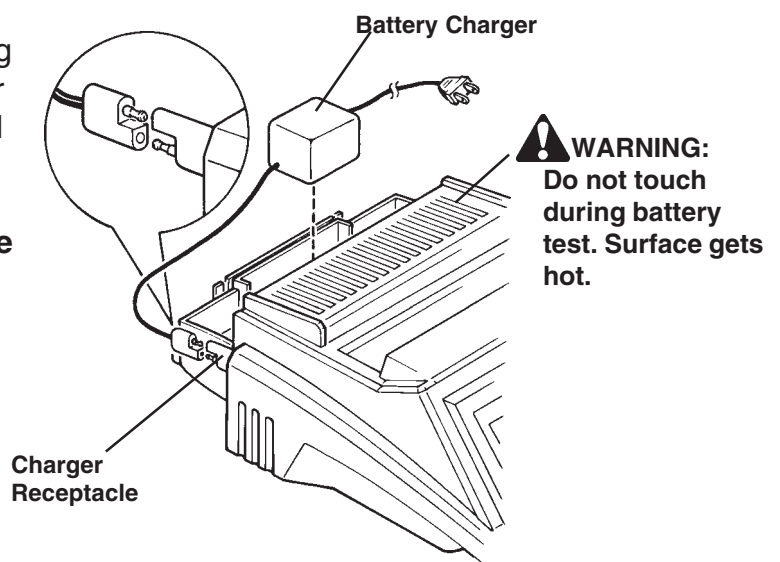


Figure 1

Test Flowcharts

For a comprehensive electrical system test, run the following tests in order:

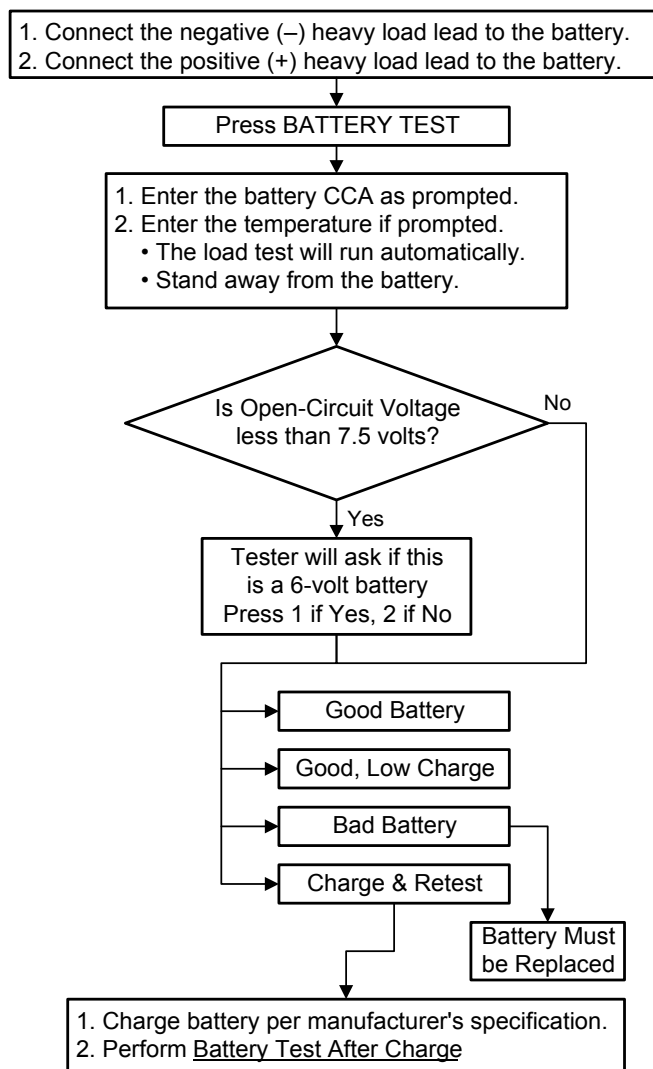
1. Battery Test
2. Starting Test
3. Charging Test

The following flowcharts help guide you through the tests. Refer to sections in this manual for more detailed instructions.

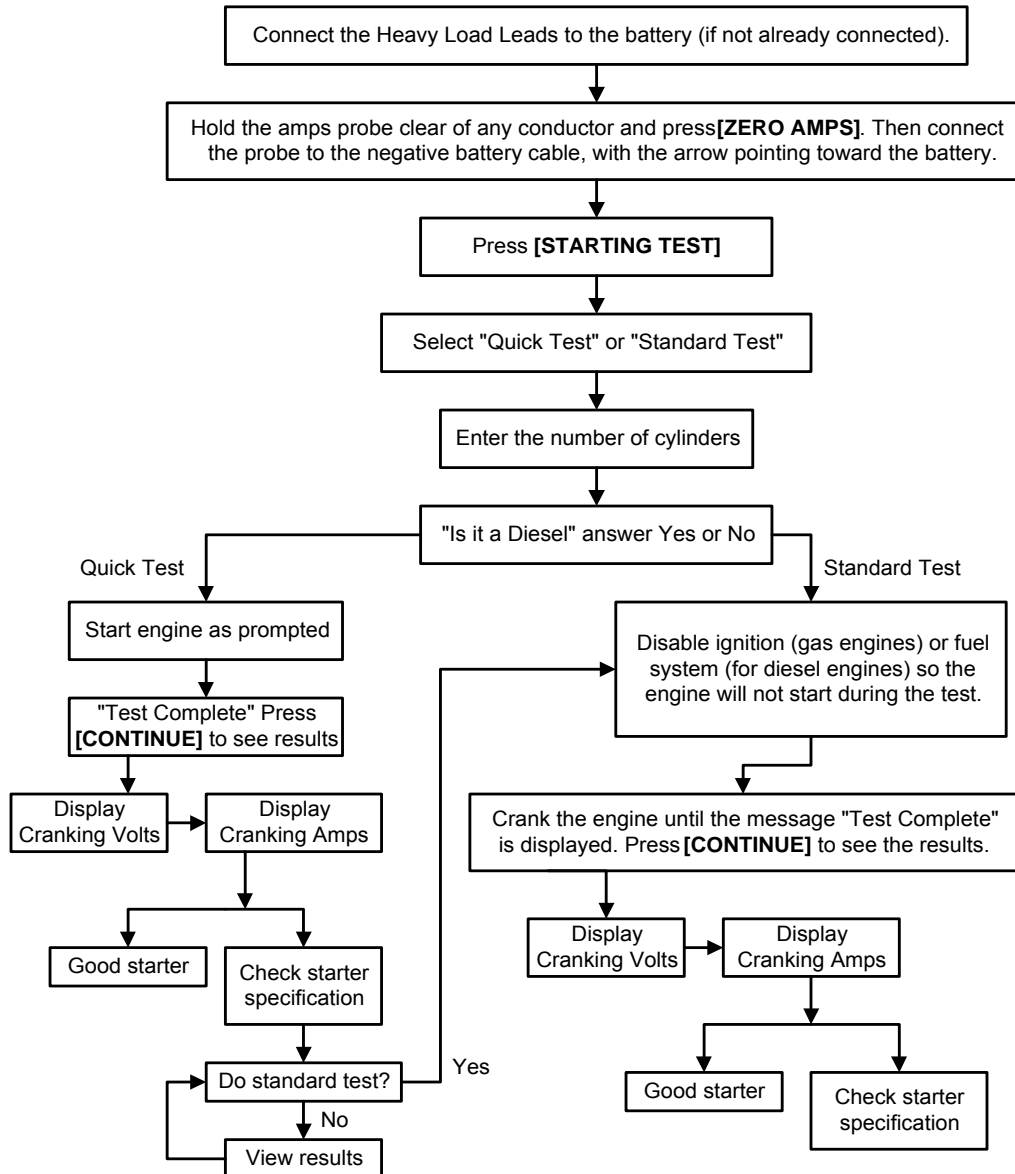
BEFORE TESTING:

1. Make sure the vehicle battery cables and terminals are clean. Wire brush them if necessary.
2. Inspect the following and repair any problems before testing: Belts, belt tension, battery cables, connections, battery hold down, battery condition, battery fluid level.

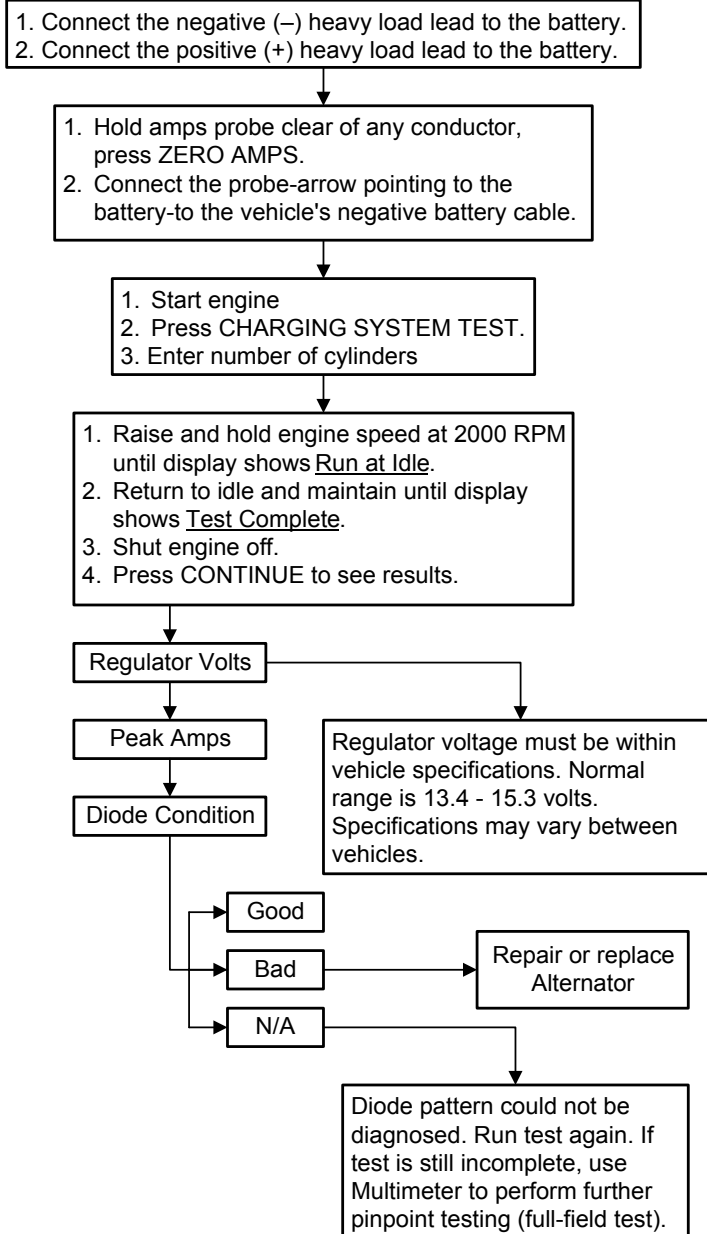
Battery Test



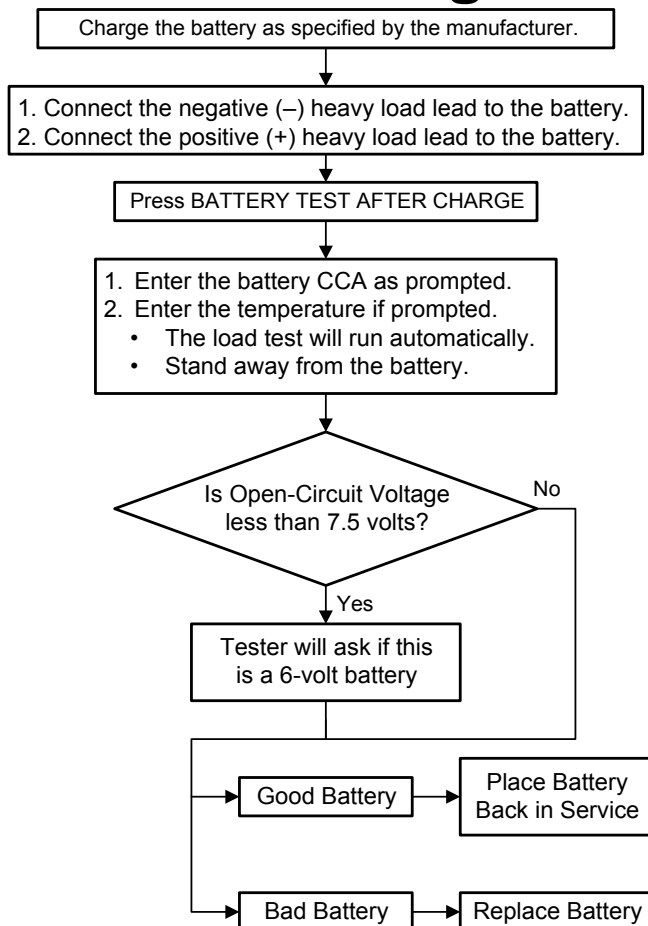
Starting Test



Charging System Test



Battery Test After Charge



NOTE

Battery Test and Battery Test After Charge are valid for 6- and 12-volt batteries. Starting Test and Charging System Test are valid ONLY for 12-volt batteries.

Introduction

Available Tests

Battery Test - Automatic test to determine whether an automotive battery is good, bad, or requires charging.

Starting Test - Tests the condition of the starter to show cranking volts, cranking amps and whether the starter is good or bad.

Charging System Test - Checks the charging system at high RPM and at idle to show regulator volts and peak amps. Indicates whether alternator diodes are good or bad.

Battery Test after Charging - This test can only be used on a battery that has already been tested once and has triggered the Charge and Retest message. The battery must be fully charged according to the battery manufacturer's specifications before this test is performed. The procedure for testing after charging is the same as the Battery Test, except that the computer takes charging into consideration when it diagnoses the battery.

Multi-Meter - This function shows RPM, volt-meter readings, battery voltage and DC amps.

Displays

There are three liquid crystal displays on the face of the tester (see Figure 2):

Main Display - (Top) - shows messages, information, and results for automatic tests as well as multimeter information.

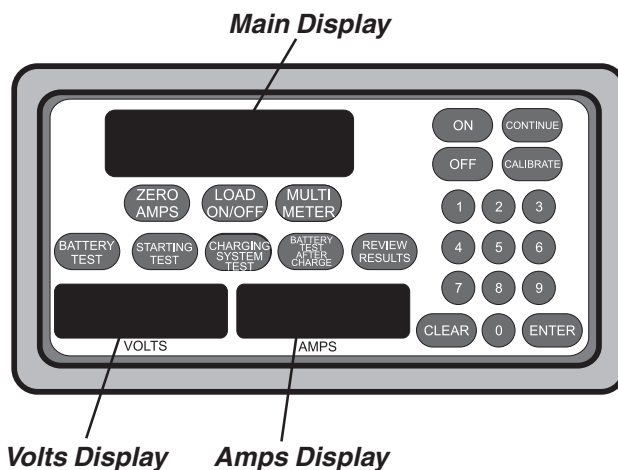


Figure 2

Volts Display - (Lower left) - shows battery voltage, as read through the battery load leads. The range is to +/- 40.00 DC Volts.

Amps Display - (Lower Right) - shows current (amps), as read through the amps probe. The range is 0 to +/- 1000 Amps.

Amps readings are either negative or positive. A negative reading has a minus sign (-); a positive reading has no sign.

When the amps probe is hooked up to a vehicle (clamped around the vehicle's negative battery cable with the arrow pointing towards the battery), a negative reading indicates a battery drain; a positive reading indicates the battery is being charged.

Keypad

The tester emits a beep when a key is pressed and a command is accepted. The tester indicates an entry error has been made by emitting a longer, lower tone.

1. POWER keys - Used to turn the tester on and off. If the tester is not used for 15 minutes, it will automatically turn itself off, but test data will still be saved. See Review Results for details.
2. CONTINUE key - Used during automatic testing to move from one screen or step to the next. The main display reads <<CONT>> when this key is active.
3. NUMERIC keys; CLEAR and ENTER keys - Used to enter information, such as number of cylinders, into the computer during testing.
4. TEST SELECTION keys - Used to select automatic tests.
5. FUNCTION keys - Used to select functions other than automatic tests.
6. LOAD ON/OFF key - Used for manual battery load testing, this key applies and releases a battery load. The load is automatically released after 15 seconds if unused.

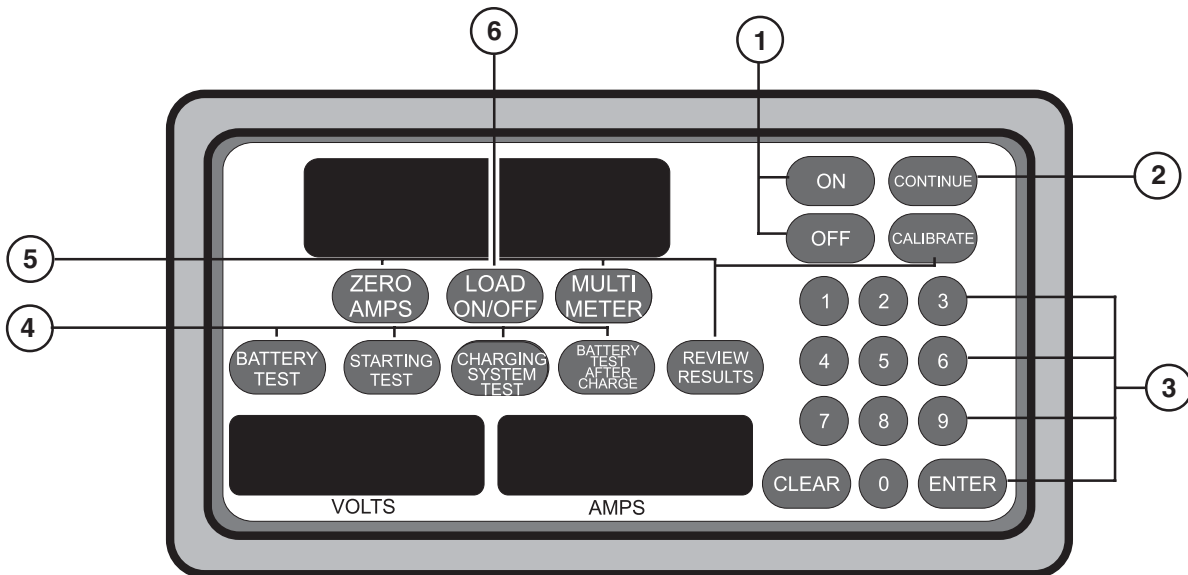


Figure 3

Test Leads

Heavy Load Leads

The heavy load leads are used to read system voltage and to put a load on the battery during load tests. The computer's battery tach feature uses heavy load leads to read engine RPM.

Connections:

1. Make sure battery cables and terminals are clean. Wire brush them if necessary.
2. Clamp the black (negative) load lead to the negative battery terminal.
3. Clamp the red (positive) load lead to the positive battery terminal.

Amps Probe

The amps probe is a hall effect lead used to read the current (amps) flowing through any conductor it is clamped around. During the starting and charging tests, the probe reads system amperage. The probe can also be used with the multimeter to read amps anywhere. The probe is not used for battery testing.

Connections

Clamp the probe around the vehicle negative battery cable, making sure the arrow on the probe is pointing towards the battery. Also be sure the probe is around all wires running to the negative battery terminal connector.

The Zero Amps procedure sets the amps probe to zero.

Voltmeter Leads

The voltmeter leads are used to read search volts during multimeter testing. Use the positive and negative voltmeter leads to read the voltage drop between any two points in a circuit.

Notes on Test Results

The results of the automatic tests are shown on the main display at the end of each test.

Results are also held in memory, even after the tester is turned off. To review the latest results, press the [Review Results] key. If the tester has been off since the latest test, press [Review Results] immediately after turning the tester on. If any other test key is pressed after turning the tester back on, the old test results are lost. See the [Review Results](#) section in this manual for complete details.

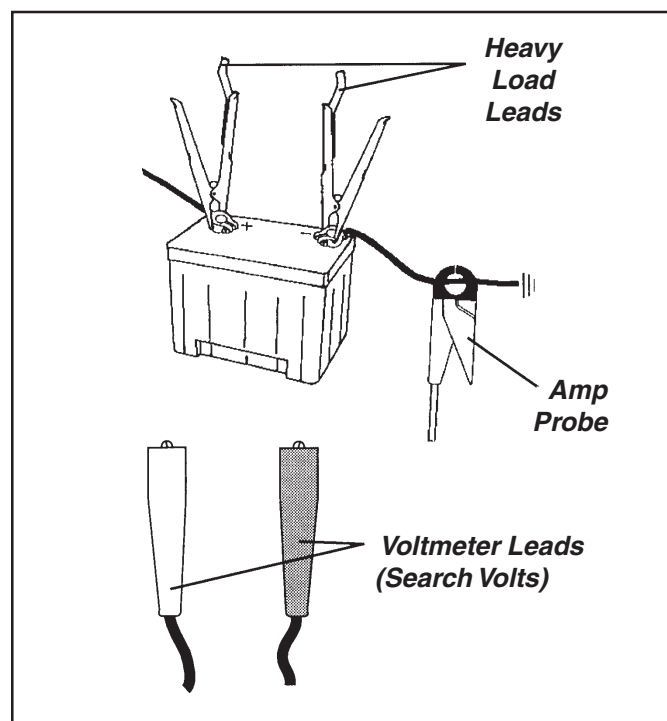


Figure 4

Battery Tachometer

This tester is equipped with a battery tachometer that enables the tester to read engine RPM through the battery without having to connect a separate tachometer lead.

Battery Tachometer Limitations

- The Battery Tach range is 0 to 3000 RPM.
- When a load is applied to the battery, or when certain battery conditions change, the RPM readings may be temporarily interrupted. When this occurs, erratic RPM values may be displayed, or the display may read “N/A” in place of the RPM. The readings normally recover after a few seconds, when the battery condition stabilizes. Wait for readings to appear and stabilize before continuing.
- In unusual cases, the battery tachometer will not be able to get any RPM readings at all. This may happen under one of two conditions:
 1. The electrical systems on certain vehicles may operate outside the range of the battery tachometer.
 2. Certain alternator conditions may prevent the battery tachometer from getting a reading.

In either case, “N/A” will appear permanently on the display in place of the engine RPM. When this occurs, wait 15 seconds to make sure the “N/A” reading is permanent. If it is, the tachometer readings are not available for the vehicle being tested.



The Charging Test is the only automatic test affected by an N/A reading. An alternate procedure is available that allows completion of a charging test when RPM is not available. See the Charging System Test section of this manual.

Recharging

- The tester is equipped with its own internal battery and charger.
- The battery must be charged overnight at least once a week. The manufacturer recommends storing the tester on the charger every night.
- To save battery power, the tester automatically shuts off if not used for 15 minutes.
- To optimize battery life, do not leave the tester on charge for more than 24 hours at a time.

To Charge the Battery

Use the charger provided with your tester. There are other chargers that may look the same, but they will damage the tester.

1. Plug the charger into the tester socket.
2. Plug the charger power cord into a standard wall outlet.

To Begin Testing

When the tester is first turned on, the main display shows search volts (a voltmeter), engine RPM, and the number of cylinders (see Figure 5). This is the multimeter function. Complete instructions for the multimeter are in the [Multi-Meter](#) section of this manual.

To Abort Testing

Press one of the test selection keys. The tester will move to the beginning of the test selected.

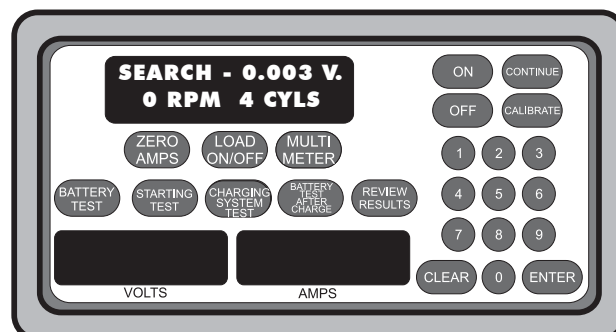


Figure 5

Automatic Tests

Battery Test

The battery test uses a number of variables, including temperature, recovery voltage and other electrical factors to diagnose a battery. It tells you whether the battery is good, bad or requires charge and retest.

Hookup

Make sure the vehicle battery cables and terminals are clean. Wire brush them if necessary.

1. Clamp the black load lead to the vehicle negative battery terminal.
2. Clamp the red load lead to the vehicle positive battery terminal.

Test Procedure

- A. Press [BATTERY TEST].

If, after pressing [BATTERY TEST], the display reads CONNECT CLAMPS, repeat the hookup procedure; make sure the load leads are connected securely.

- B. The display reads "INPUT CCA: 0) CHANGE UNITS."

Press [0] to change the battery rating units. The unit reading on the display will change to CA. Press [0] again to page through MCA, DIN, IEC, EN, and A-HR. The unit setting will be retained after tester power is turned OFF.

Enter the battery rating, using the numeric keypad (see Figure 6). Then press [ENTER] to begin the Battery Load Test. The battery rating is usually printed on the battery.

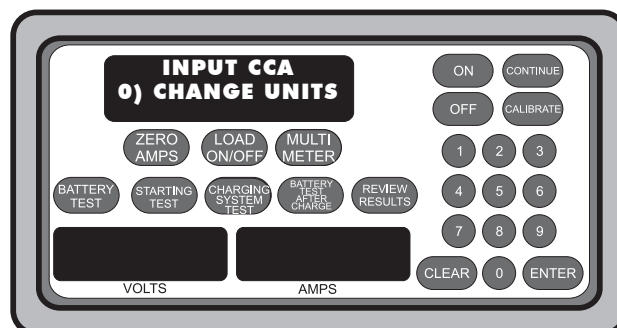


Figure 6

- C. The display reads "BATT: REGULAR 0) CHANGE TYPE" (see Figure 7). Press [Continue] to accept the battery type.

Press [0] to change the battery type. The battery type listed on the display will change to AGM/OPTIMA. Press [0] again to change the battery type back to REGULAR.

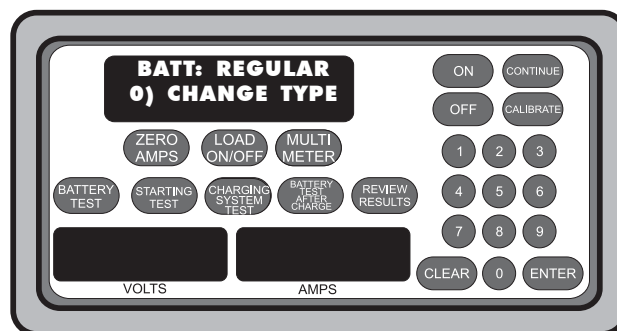


Figure 7

Press [Continue] to accept the battery type

- D. The display now reads TEST IN PROGRESS (see Figure 8).

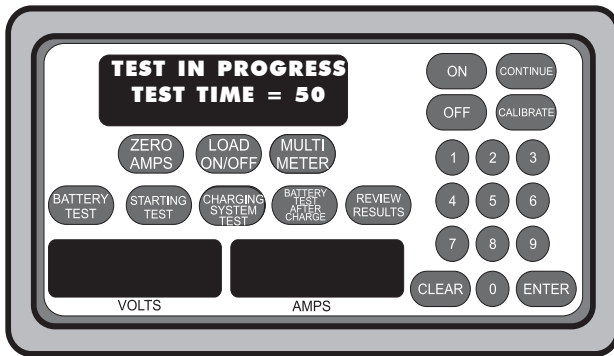


Figure 8

The tester may wait a few seconds to rest the battery. When the test begins, a 50-second countdown is displayed. During this 50 seconds, the tester applies a load to the battery, releases it to let the battery recover, then applies it again. When the load is applied, listen for the sound of the solenoid closing.

NOTE To stop during the test, press any function key, or press [POWER OFF].

WARNING Do not touch the vent located at the rear of the tester. Excess heat given off during the battery testing procedure can make this surface very hot.

Test Results

The Main Display reads “TEST RESULT:” and shows the diagnosis (see Figure 9):

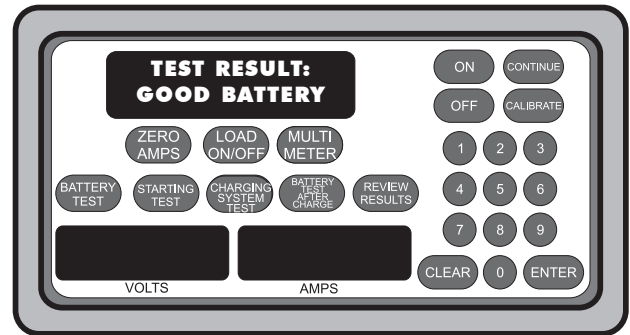


Figure 9

IS 6 VOLT BATT? - This message will be displayed if the battery open-circuit voltage is less than 7.5 volts. Press [1] if YES, [2] if NO.

GOOD BATTERY - The battery is capable of holding a charge and performing to specs.

GOOD, LOW CHARGE - The battery is good, but it should be recharged.

BAD BATTERY - The battery will not hold a charge and perform to specs. It should be replaced.

CHARGE & RETEST - The battery condition cannot be determined until after it is fully charged.

CAUTION The battery must first be completely charged per the battery manufacturer’s recommendations before running the Battery Test After Charge.

Starting Test

In the starting test, the operator has the option of performing a Quick Starting Test or the Standard Starting Test. The Quick Starting Test allows the operator to perform a quick check of the starting system without disabling the engine. The Standard Starting Test requires disabling the engine for a more thorough test.

Hookup

Make sure the vehicle battery cables and terminals are clean. Wire brush if necessary.

1. Clamp the black load lead to the vehicle negative battery terminal.
2. Clamp the red load lead to the vehicle positive battery terminal. Make sure both load leads are connected securely.
3. Remove the amps probe from any conductor and press the **[Zero Amps]** key (See “Zero Amps” section for complete details.).

Then clamp the amps probe around the vehicle’s negative battery cable, so the arrow on the probe points toward the battery. Be sure the probe is around all wires running to the vehicle’s negative battery terminal connector.

Test Procedure

- A. Press **[STARTING TEST]**. The display will ask you if you want to run a Quick Test or Standard Test. Press **[1]** to run the Quick Test or **[2]** to run the standard test.
- B. The display will read “INPUT # CYLS” (see Figure 10). Type in the vehicle’s number of cylinders on the numeric keypad and press **[ENTER]** (The computer accepts numbers from 2 to 12.).
- C. The display asks “Is it a diesel?” Press **[1]** if YES; **[2]** if NO.

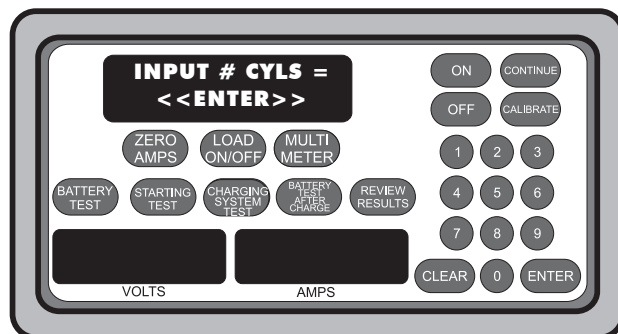
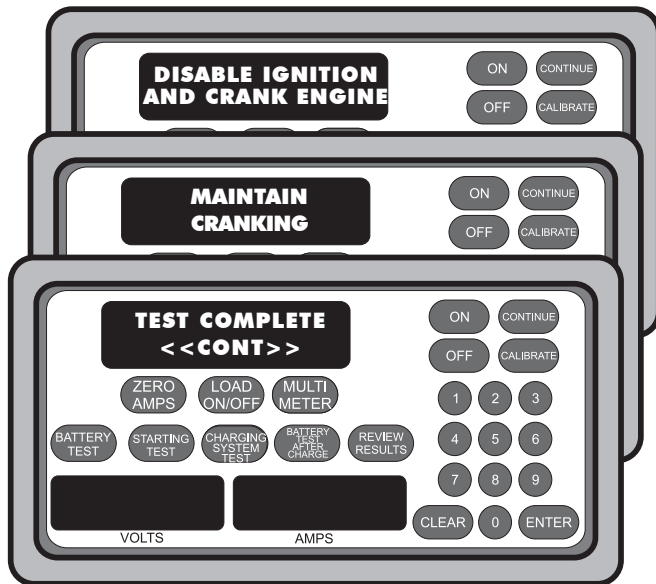


Figure 10

Quick Test

- D. If you selected the Quick Test, you will be prompted to start the engine. Once you have started the engine, the test will run automatically, and then display “TEST COMPLETE.”
 1. Press **[CONTINUE]**. The display shows cranking volts. Press **[CONTINUE]** again. The display shows cranking amps.
 2. Press **[CONTINUE]** again. If the display reads “GOOD STARTER,” the test is complete. If the display reads “CHECK STARTER SPEC,” press **[ENTER]**. You will be asked if you wish to run the standard test. If you select **[YES]**, proceed to step E, “Standard Test”. If you select **[NO]**, the tester will cycle through the results again. The results are displayed in a loop, so press **[CONTINUE]** again to return to cranking volts. Press **[CONTINUE]** again to see cranking amps; and so on.

To exit the loop, select another test.



Figures 11, 12 and 13

Results

To see the test results, press [**CONTINUE**]. The display shows cranking volts. Press [**CONTINUE**] again to see cranking amps. Press [**CONTINUE**] again to see starter diagnosis: either “GOOD STARTER” (see Figure 14) or “CHECK STARTER SPEC”.

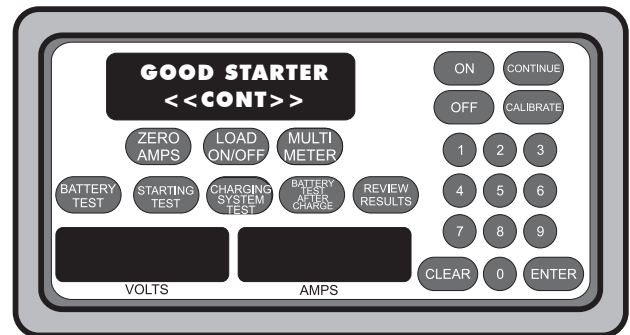


Figure 14

Standard Test

- E. The display will read “DISABLE IGNITION AND CRANK ENGINE” (if not a diesel) (see Figure 11), or “DISABLE FUEL SYSTEM AND CRANK ENGINE” (if a diesel). Disable the ignition or fuel system so the engine will not start when cranked. When the vehicle is disabled, crank the engine.
- F. The display now reads “MAINTAIN CRANKING” (see Figure 12). Keep cranking the engine for a few seconds, until the display reads “TEST COMPLETE.”
- G. When the test is complete, the display reads “TEST COMPLETE” or “TEST INCOMPLETE” (see Figure 13). Stop cranking the engine.

The results are displayed in a loop, so press [**CONTINUE**] again to return to cranking volts. Press [**CONTINUE**] again to see cranking amps; and so on.

To exit the loop, select another test.

DIESEL STARTERS – Some large diesel engines with good starters may draw cranking current in excess of the tester’s diagnostic limits. Always check the manufacturer’s specifications before condemning diesel starters.

“TEST INCOMPLETE” – The display will show “TEST INCOMPLETE” instead of results if the vehicle’s battery was too low to continue cranking, or if, for any other reason, cranking was discontinued during the test. Correct the problem and run the test again.

Prevent the Engine from Starting:

Prepare the vehicle so it will not start when the engine is cranked. Use one of the methods listed below, depending on the type of vehicle being tested, or refer to manufacturer's information.

1. Disconnect the battery power to the positive coil terminal. This prevents the coil from activating the secondary ignition.
2. On vehicles with a conventional distributor cap, remove the coil lead from the top of the distributor cap and ground it.



Failure to properly ground the wire may result in damage to the system.

3. On some computer-controlled vehicles equipped with fuel-injection, hold the throttle wide open while cranking the engine. The fuel injection system automatically disables itself because it assumes that the engine is flooded. If the engine starts at first, shut it OFF and crank again, keeping the throttle wide open.
4. On vehicles with Throttle Body Injection (TBI) or Central Fuel Injection (CFI), disconnect the fuel injector. This will disable fuel flow.

OR

5. Remove the power to the fuel pump to disable fuel flow on any vehicle with Electronic Fuel Injection (EFI) or diesel engine.

Charging System Test



The Charging System Test is valid for 12-volt systems only.

In the charging system test the tester takes readings both at high RPM and at idle. Results show regulator volts and peak amps, and whether the alternator diodes are good or bad.

Hookup

Make sure the vehicle's battery cables and terminals are clean. Wire brush them if necessary.

1. Clamp the black load lead to the vehicle's negative battery terminal.
2. Clamp the red load lead to the vehicle's positive battery terminal. Make sure both load leads are connected securely.
3. Remove the amps probe from any conductor and press Zero Amps key. See the [Zero Amps](#) section for complete details.
4. Then clamp the amps probe around the vehicle's negative battery cable, so that the arrow on the probe points toward the battery. Be sure the probe is clamped around all wires running to the vehicle negative battery terminal connector.

Test Procedure

1. Start the engine.
2. Press [CHARGING SYSTEM TEST]. The display must show the correct number of cylinders in order for the RPM reading to be correct. The bottom line of the display shows the number of cylinders, which is automatically set to four (4) unless you have changed it during a previous test.

To change the number of cylinders, press that number on the numeric keypad. Press any number from 2 - 12.

3. The top line of the display reads “RUN AT 2000 RPM” (see Figure 15). Set the engine speed to at least 2000 RPM. When the computer detects RPM around 2000, the display flashes “MAINTAIN 2000 RPM.”

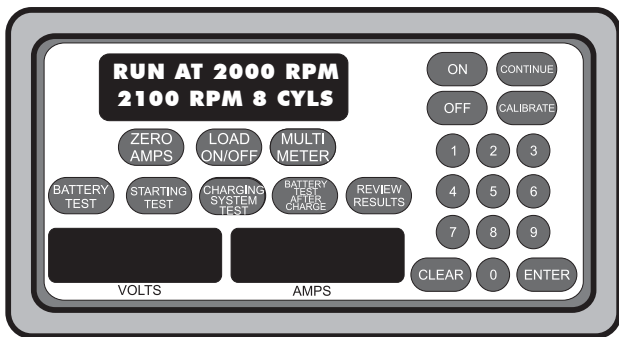


Figure 15

If the RPM reading says “N/A,” see [RPM Not Available](#), later in this section.

Hold the RPM at 2000. After an adjustment period, a counter appears in the corner of the display and counts down from 10 seconds (see Figure 16).

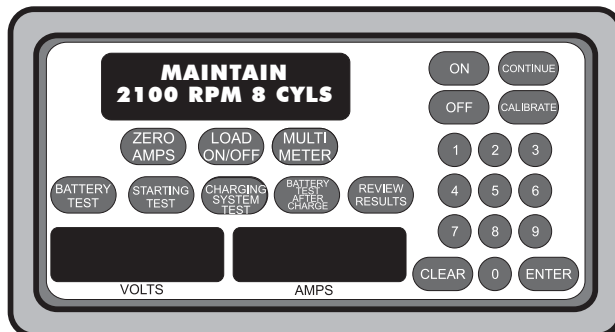


Figure 16

4. After 10 seconds, the display reads “RUN AT IDLE” (see Figure 17). Reduce the engine speed to idle. When the computer detects idle speed, the display reads “MAINTAIN IDLE.”

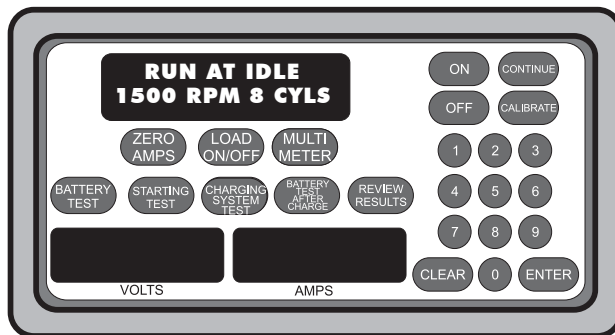


Figure 17

Maintain the engine at idle speed. For engines larger than 4 cylinder, idle means less than 1000 RPM (see Figure 18). For 4-cylinder or smaller engines, the idle is 1200 RPM or less. The tester will check the diode condition.

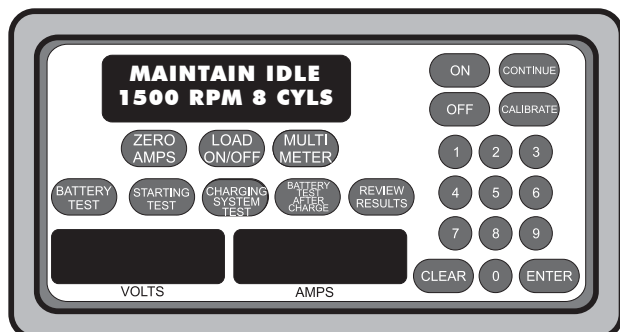


Figure 18

If the engine speed is not low enough, set it as low as possible and press [CONTINUE].

- After the idle test, the display may read "RUN 800-1000 RPM" (see Figure 19). This message appears if the RPM was not high enough, or if conditions were not right during the diode reading. For the computer to properly read the diode condition, the RPM must be between 800 and 1000. Raise the RPM to between 800 and 1000 and hold it.

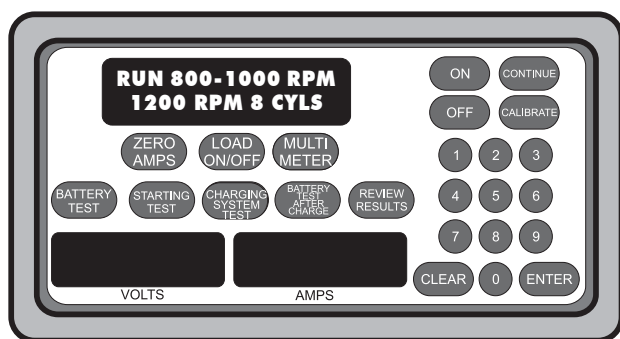


Figure 19

NOTE If the RPM is "N/A," press [CONTINUE]. Absence of RPM does not affect test accuracy.

The display then reads "MAINTAIN IDLE." Hold the idle between 800 and 1000 RPM while the diode pattern is read again. This process may last a few seconds. When the test is complete, the display reads "TEST COMPLETE."

- The test is now complete. The display reads "TEST COMPLETE" or "TEST INCOMPLETE." Shut the engine off.

Press [CONTINUE] to see the results.

RPM Not Available

If the battery tach cannot read the RPM during the charging test, the RPM value reads "N/A" (Not Available). In this case, when the charging test reads "RUN ENGINE AT 2000 RPM," the lower right of the display flashes "<<CONT>>" (see Figure 20). It is still possible to run the test as follows:

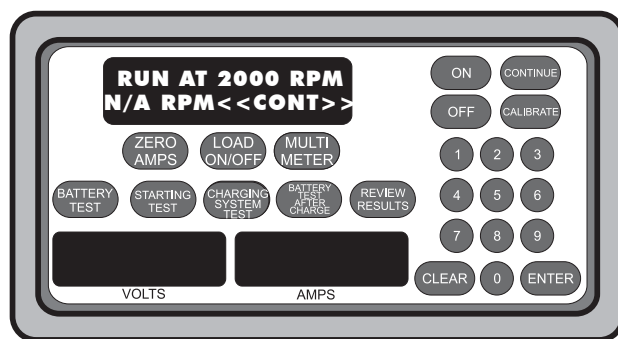


Figure 20

- Run the engine as close to 2000 RPM as possible. Use the vehicle dashboard tachometer, or estimate engine speed. When the engine speed is approximately 2000 RPM, press [CONTINUE].

2. Hold the engine speed at approximately 2000 RPM until the display reads “RUN AT IDLE” (see Figure 21). Then set the engine at idle and press [CONTINUE]. The remainder of the charging test runs normally.

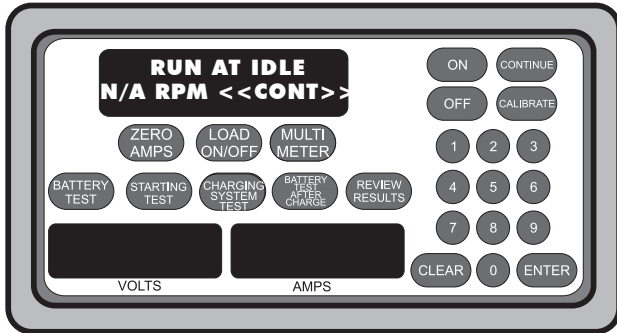


Figure 21

2. In any other case, the N/A result requires further pinpoint testing. Use the multimeter to perform such tests as a full-field test, fusible link test, etc. The exact procedures depend on the vehicle being tested. Refer to the shop manuals or to the manufacturer’s information.

Results are displayed in a loop. Press [CONTINUE] to see regulator volts. Press [CONTINUE] again for peak amps, and so on.

Battery Test After Charge

Run this test ONLY after both of the following conditions have been met:

- The message “CHARGE AND RETEST” appeared after the regular battery test was run on the same battery currently being tested;
- The battery has been completely charged following the battery manufacturer’s charging recommendations.

Hookup and Test Procedure

The initial test procedure is the same as for the other Battery Test:

1. Connect test leads.
2. Enter battery rating (CCA, CA, etc.).
3. Perform test.

Results

This test takes into account that the battery has just been charged. It will not diagnose any battery as CHARGE AND RETEST. It calls the battery good or bad.

Results

The first result displayed is regulator volts. This is the maximum voltage read during the charging system test.

1. If the amps stayed higher than 20 during the charging test, a star (*) appears near the regulator volts on the display. The regulator volts are probably lower than normal because the charging current was so high.
2. Press [CONTINUE] to see the peak amps. This is the maximum alternator output detected during the test.
3. Press [CONTINUE] again to see the diode condition; the display says the diode pattern is either good or bad.

The display message may read “N/A” (Not Available). When this occurs:

1. If RPM was high during the idle part of the test [CONTINUE] was pressed, run the charging test again. Make sure the idle is adjusted correctly before running the test.

Other Functions

Multi-Meter and Load On/Off Key

Whenever the tester is turned on, the default setting is Multi-Meter. The multimeter function can also be accessed by pressing [MULTI-METER] from any other test.

The multimeter function displays all meter readings at the same time. The main display shows RPM and Search Volts (voltmeter reading). Current (amps) and load lead volts are also shown on their respective displays.

Use the multimeter function along with the LOAD ON/OFF key for manual testing.

Multi-Meter

The top line of the main display reads “SEARCH - X.XX V.” (see Figure 22). This is the Search Volts reading. The voltage being read through the search volts leads is $\pm 40.00V$ DC.

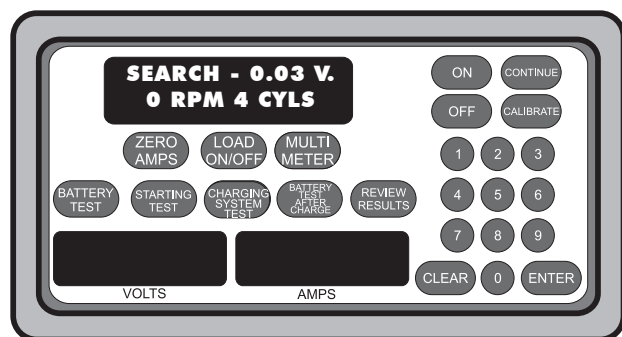


Figure 22

When using the search volts leads, make sure to use both leads. If only one lead is used, the search volts reading will be inaccurate.

The bottom line of the display shows RPM and the number of cylinders, which is automatically set to 4 unless you have changed it during a previous test. Or, if 0 is selected for the number of cylinders, RPM will be N/A (Not Available).

The display must show the correct number of cylinders in order for the RPM reading to be correct.

To change the number of cylinders, press that number on the numeric keypad. The tester will accept any number from 2 - 12.

If the RPM is not displayed at all, make sure the battery load leads are securely connected and the correct number of cylinders is displayed.

Load On/Off Key

Use the LOAD ON/OFF key to put a load on the battery for testing purposes, as follows:

1. Press [LOAD ON/OFF] once to put the load on. The bottom line of the display reads "LOAD ON" (see Figure 23).
2. The load will remain on for 15 seconds unless you press [LOAD ON/OFF] to release it. After 15 seconds, the load is automatically released.

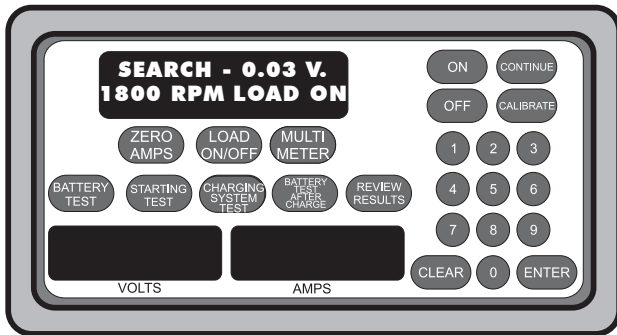


Figure 23

3. After the load is released, there is an automatic cool down period lasting as long as the load period. The display reads "WAIT" and counts down to zero (see Figure 24). At zero, the multimeter display returns.

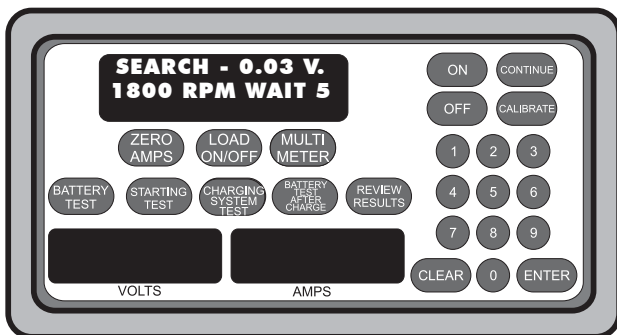


Figure 24

Review Results/Print Results

Press [REVIEW RESULTS] to display the latest results from all tests that were performed. Results are displayed in a CONTINUE loop; keep pressing [CONTINUE] to page through them, as described on the next page.

NOTE If you have purchased the optional printer, and it is connected properly to the tester and turned on, when you press [REVIEW RESULTS], the display will read:

- 1) VIEW RESULTS
- 2) PRINT RESULTS (This will give the user a printout of all test results in the order the tests were performed.)

If the optional printer is present and the VIEW RESULTS/PRINT RESULTS menu does not appear, make sure the printer is plugged in to an electrical outlet, is connected properly to the tester's printer port (see Figure 25) and is turned on. Press [REVIEW RESULTS] again to display the VIEW/PRINT menu.

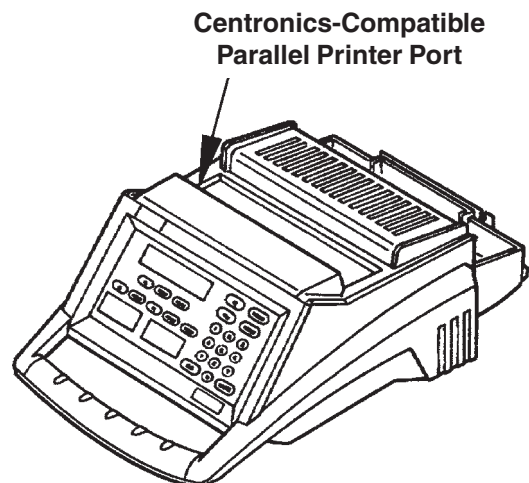


Figure 25

Results from the most recent tests will be stored even after the power is shut off. To retrieve results after the power is shut off, turn the power back on and press [REVIEW RESULTS].

When a test is selected after turning the power back on, all old results are cleared from memory to prepare for the new testing session.

If a certain value has not been obtained since the power was last turned on and a test selected, that value will be skipped in the loop. This is the loop:

1. Press [REVIEW RESULTS] to see Battery diagnosis.
2. Press [CONTINUE] to see Cranking Volts.
3. Press [CONTINUE] to see Cranking Amps.
4. Press [CONTINUE] to see Starter diagnosis.
5. Press [CONTINUE] to see Regulator Volts.
6. Press [CONTINUE] to see Peak Amps.
7. Press [CONTINUE] to see Diode Pattern results.

To get out of the loop, select another test or the multimeter function, or turn the power off.

NOTE Provided the tester has not been turned off, you may disconnect the printer from the tester, move the tester to another location to perform a test, then bring the tester back and reconnect the printer in order to print out test results.

Zero Amps

Zero Amps sets the amps probe reading to zero. For optimum performance, run this procedure before every Starting and Charging test, and before using the Amp reading on the Multimeter.

When the amps probe is “zeroed,” the computer sets the probe reading to zero. This is slightly different from the complete calibration procedure. During the calibration procedure, the computer sets the reading at zero at an amperage reading that is determined by the computer. The calibration procedure is more thorough, but takes longer to complete.

The Zero Amps procedure is very fast and may be performed frequently to serve as a quick assurance of accuracy. Calibration, on the other hand, does not have to be performed very often. See the [Calibration](#) section of this manual for more information.

Procedure

1. Remove the amps probe from around any wire and hold it away from any conductors present. Allow it to close completely. Do not place your fingers or anything else through the hole.
2. Press [ZERO AMPS]: If the display reads “REMOVE AMP PROBE,” make sure the probe is not around a conductor. Then press [CONTINUE].)

The display reads “PROBE CALIBRATED.” The probe is zeroed.

The tester automatically switches to the multimeter function in approximately three (3) seconds, unless another test or function is selected.

Calibration

If the tester senses it is out of calibration, the message “CALIBRATION IS NEEDED” will appear.

The procedure will calibrate all the tester’s leads - the load leads, amps probe, and search volts leads.

A good, fully-charged 12-volt automobile battery is needed to complete the procedure.

Procedure

To calibrate the tester, follow the steps below. If any messages appear on the display that do not appear in these instructions, follow the directions on the display. For further explanation of any displayed messages, refer to the MESSAGES section of this manual.

1. Press [CALIBRATION]. The display reads:
1 ENGLISH
2 SPANISH
Press [1] for English, or [2] for Spanish.
2. The display reads: "SET DATE xx/xx/xx" (see Figure 26). If the displayed date is correct, press [CONTINUE] and go to Step 4.

If the date is not entered or is not correct, use the numeric keypad to enter the correct date then press [ENTER].

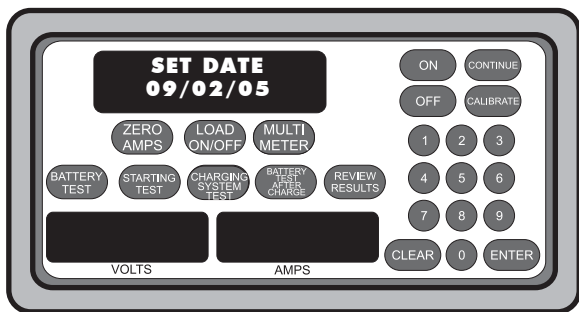


Figure26

3. The display reads "SET TIME 24HR xx:xx:xx" (see Figure 27). Use the numeric keypad to enter the correct time, then press [ENTER].

NOTE As noted on-screen, the unit has a 24 hour clock (also known as "military time").

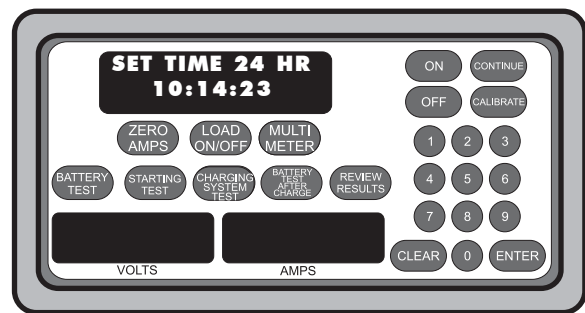


Figure 27

4. The display reads “INPUT TEMP UNITS.” Press:
[1] for Fahrenheit,
[2] for Celsius.

This sets the units for manual temperature input during battery test.

NOTE Manual temperature input is not always necessary.

Temperature settings will be retained after the tester is shut off.

5. The display reads “SHORT SRCH VOLT LEADS” (see Figure 28). To short the search volts leads, clip them together so that the metal clips are in complete contact with each other. Then press [CONTINUE].

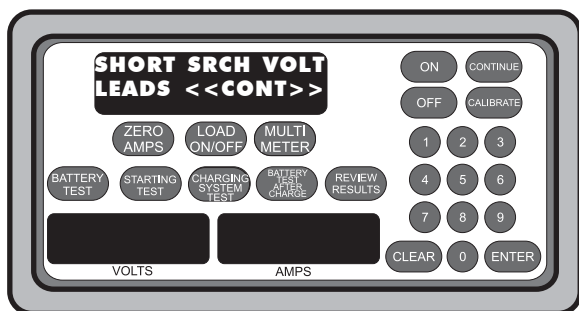


Figure 28

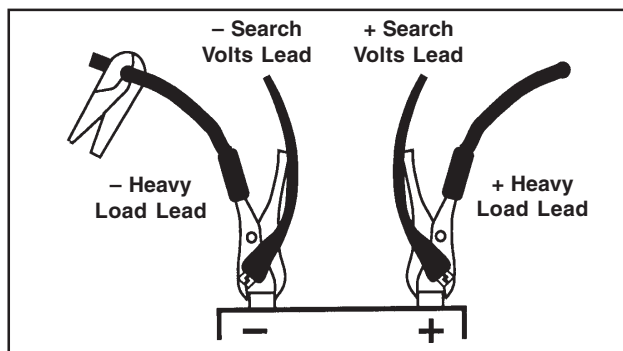


Figure 30

6. The display reads “SEE CALIBRATION DIAGRAM” (see Figure 29). Connect all the test leads as shown in the diagram (see Figure 30) to a good, fully-charged 12-volt automobile battery:

- A. Connect the positive (+) load lead to the positive battery terminal.
- B. Connect the negative (-) load lead to the negative terminal of the battery.
- C. Connect the search volt leads to the vehicle battery posts. Connect the positive to positive, negative to negative. If a connection cannot be made to the battery posts, clip them to the brass part of the load clamp jaws.

D. Connect the amp probe around the negative load lead cable. When the leads are connected as shown in Figure 30, press [CONTINUE].

7. Under normal conditions, the display now reads “CALIBRATION IN PROGRESS.”

During calibration, the tester puts a load on the battery. Calibration takes only a few seconds.

8. When calibration is complete, the display reads “UNIT CALIBRATED.” If no other selection is made, the display automatically switches to the multimeter function after 15 seconds.

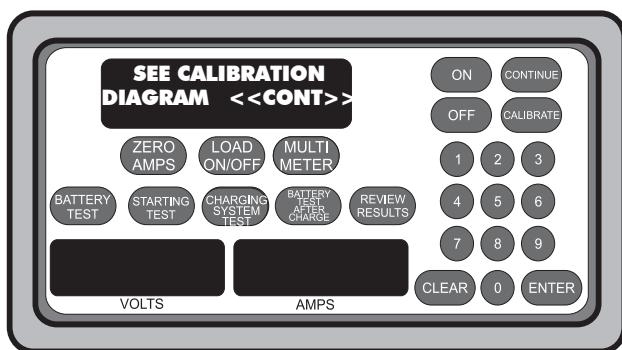


Figure 29

Messages

The following are main display messages that may appear on occasion. These messages are not covered in the standard operating procedure.

Testing Messages

AMP PROBE FAULTY - The amps probe is faulty. See Diagnostic Procedure in the Maintenance section of this manual.

BATTERY VOLTAGE TOO LOW - The automobile battery voltage is too low for testing.

CALIBRATION IS NEEDED - The test leads must be calibrated. Run the calibration procedure.

CHECK HEAVY LOAD CLAMPS - The heavy load lead connection is erratic when the load is placed on the battery. Check connections.

CONNECT BATTERY CLAMPS - The battery clamps are reading no voltage.

SWITCH BATTERY CLAMPS - The battery clamps are attached to the wrong polarity battery posts. Switch them.

Calibration Messages

BATTERY VOLTAGE TOO LOW - The automobile battery voltage is too low to calibrate. Connect the leads to a good, fully charged battery and repeat the procedure.

CHARGE BATTERY & REPEAT - The car battery does not have enough charge to be used for the calibration procedure. Connect leads to another, fully charged battery and press [CONTINUE]. If another battery is unavailable, remove the leads and completely charge the original battery. Then repeat the procedure.

CHECK HEAVY LOAD LEADS - Readings are unstable when the load is placed on the battery. Check the heavy load lead connections.

CHECK SEARCH VOLT LEADS - Make sure the search volts leads are properly connected. Press [CONTINUE]. The leads may be correct but the battery is too low.

CONNECT BATTERY CLAMPS - The battery clamps are reading no voltage.

CONNECT AMP PROBE - Connect the amps probe around the negative load lead cable.

CONNECT SEARCH VOLTS - The tester is not reading sufficient voltage through the search volts leads when it tries to calibrate. Make sure the search volts leads are properly connected, then press [CONTINUE].

SEARCH VOLTS NOT SENSED - The search volts are not sensed by the computer. See Diagnostic Procedure in the Maintenance section of this manual.

SEARCH VOLTS OUT OF CAL - The search volts are beyond specs required for automatic calibration. See Diagnostic Procedure in the Maintenance section of this manual.

SWITCH SRCH VOLT LEADS - The search volts leads are attached to the battery post of the wrong polarity. Switch them.

Maintenance

Daily Maintenance

- Clean the outside surface of the tester, keypad and display. Wipe clean with a mild, multipurpose cleaner.
- Clean and inspect the test leads, as follows:

1. Clean the cables with a mild, multipurpose cleaner.



Do not use solvents or harsh cleaners on the cables; they will eventually dry out and crack the cables.

While cleaning the cables, inspect for damage and replace as necessary.

2. Keep the clamp ends clean. Use a small wire brush if necessary. Or, if the clamp ends are corroded, use emery cloth to clean the brass.



Do not use carburetor cleaner or harsh chemical solvents on the clamps. Carburetor cleaner may damage sensors.

3. Clean the clamp casings with a mild detergent or cleaner.

Diagnostic Procedure

Introduction

The test leads, charger and the tester's internal battery are user-replaceable.

The diagnostic procedure listed below helps determine whether any of these user-serviceable parts are the cause of a problem.

This section makes frequent reference to the Checks procedures in the next section.

When a user-serviceable part needs to be replaced or the tester itself needs service, call the Technical Service number listed on the inside back cover of this manual.

The First Thing to Do ...

When a tester fails, first try shutting the power off and turning it back on. Any time the tester fails, the failure may be temporary, due to a number of possible temporary conditions. Shut the power off and on a number of times, making sure to press [POWER ON] firmly for at least one (1) second every time the tester is turned on.

- **IF** the tester recovers, there is no problem.
- **IF** the problem still exists, check through the entire diagnostic procedure.
- **IF** a step does not apply, go to the next step at the same level.

1. **IF the tester does not power up correctly...**

- IF, when the tester is turned on, the top line of the LCD contains 16 boxes and the bottom line is clear, the tester has failed and cannot be repaired. Call the Technical Service number listed on the inside back cover of this manual.
- IF nothing appears on the display when tester is turned on, make sure the proper procedure is being followed. Press [POWER ON] firmly and hold it for at least one (1) second.
- IF nothing appears on the LCD display when correctly turned on, try pressing some of the keys. If a faint beep is heard when pressing a key, the battery in the tester could be discharged. Try charging the tester overnight with the included battery charger.
- IF charging the tester does not help, the charger may be faulty. Check the charger with a voltmeter, following the procedure in the Checks section.



The battery charger supplied with this tester is the only battery charger to be used to charge the tester internal battery. Use of any other charger will void the warranty, may damage the tester and may cause a fire.

- IF the charger is good but the tester still did not hold a charge, the tester may have a bad internal battery. Check the battery according to the procedure in the Checks section.

2. *If the tester does power up correctly...*

- IF, when the tester is powered up, it does not beep or respond at all when any key is pressed, the tester needs service. Call the Technical Service number listed on the inside back cover of this manual.
- IF when the tester is turned on, it continually beeps and the clamps are not connected to anything, the tester needs service. Call the Technical Service number listed on the inside back cover of this manual.
- IF the volts display (battery voltage) reads 0.00 volts or reads a highly unlikely voltage when the leads are **securely** connected to a good battery with a 12-volt charge, the tester may need service. Try connecting the leads to several different batteries, each time making sure that leads are **securely** connected to the correct battery terminals.
- IF the voltage reading is still incorrect, check the test leads with an ohmmeter, according to the procedure in the Checks section.
- IF the test leads are OK, the tester needs service.
- IF the search volts reads 0.00 volts when connected to a 12-volt battery and the load leads read correctly, check the search volts leads with an ohmmeter (see Checks section).
- IF the tester consistently displays the message “CHECK CLAMPS” during the battery test even after pressing [CONTINUE], the tester may need service. Try testing several different batteries, each time making sure that leads are **securely** connected to the correct battery terminals.
- IF the problem still occurs, check the test leads with an ohmmeter. Refer to Checks section.
- IF test leads are OK, the tester needs service. Call the Technical Service number listed on the inside back cover of this manual.



Connect both the search volts and the load leads to the battery and compare the readings. Both should read approximately the same.

Checks

These checks are used in conjunction with the preceding Diagnostic Procedure section. If there is a problem with the tester and its cause is uncertain, first run through the Diagnostic Procedure section for the appropriate checks.

Charger Check

First make sure the charger is plugged into a working outlet. To check the charger with a voltmeter:

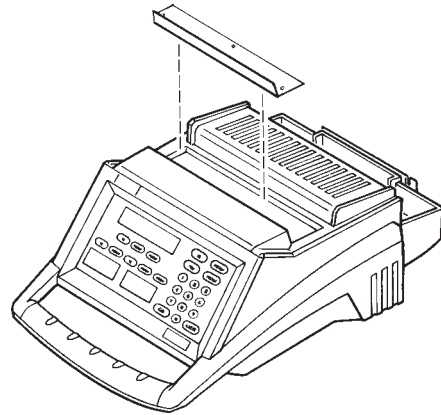
1. Plug the charger into a working outlet.
2. Read the voltage at the jack. Put the positive (+) voltmeter lead to the outside portion of the jack. Put the negative (-) voltmeter to the inside. **Make sure the polarity is correct.**
3. There should be between 4.5 and 10 volts DC. If the reading is less than 4.5 volts, the charger is not functioning correctly. Call the Technical Service number listed on the inside back cover of this manual.



The battery charger supplied with this tester is the only battery charger to be used to charge the tester internal battery. Use of any other charger will void the warranty, may damage the tester and may cause a fire.

Internal Battery Check

To access the battery, remove the three phillips head screws from the battery holder cover plate. Disconnect the wires from the battery and, observing proper polarity, check the tester's internal battery with a voltmeter, as follows:



1. First make sure the charger is good. Refer to Charger Check.
2. Using a good charger, put the tester's internal battery on an overnight charge.
3. Connect the voltmeter's positive lead to the positive (+) terminal of the battery. Put negative voltmeter lead to the negative (-) terminal of the battery. The battery should be around 6 volts when charged. If, after being fully charged by a good charger, the battery is below 6 volts, replace the battery.

Test Lead Checks

Amps Probe - If the probe is bad, an "AMP PROBE FAULTY" message will appear. Replace it.

Search Volts Leads - Disconnect the search volts leads from the tester and check them with an ohmmeter. Put one ohmmeter lead to the positive (red) search volts clip; put the other end to the positive pin. Try both pins to determine which is positive. The resistance should be less than 0.2 Ohms. If not, replace the search volts leads. Repeat the same procedure for the negative lead.

Finally, connect the ohmmeter leads to both pins. There should be no continuity between the pins. If there is, replace the lead.

Checking the Load Leads with an Ohmmeter

The ends of the load leads run under a plastic cover on the bottom of the tester. To access the load lead cable ends, remove the screws holding the cover in place. Check the leads as follows:

Positive (+) Lead:

The positive (+) lead has two separate circuits: battery load and volts.

To check the two circuits of the lead, use an ohmmeter as follows:

1. **Battery Load Circuit** - Put one ohmmeter lead to the exposed end of the cable where it is bolted to the bottom of the tester. Put the other ohmmeter lead to the clamp's lower jaw (the jaw with the red boot on the handle). Ohms should read 0.0. If the meter reads more than 0.2 ohms, make sure the clamp is clean, and recheck. If the resistance is still high, the lead should be replaced.
2. **Volts Circuit** - Where the cable is attached to the bottom of the tester are white, black and red wires from the cable that plug into connector sockets. Remove the black wire from its connector socket and connect one of the ohmmeter leads to it.

Connect the other ohmmeter lead to the upper jaw on the battery clamp. Ohms should read 0.0. If the meter reads more than 0.1 ohms, the entire positive lead should be replaced.

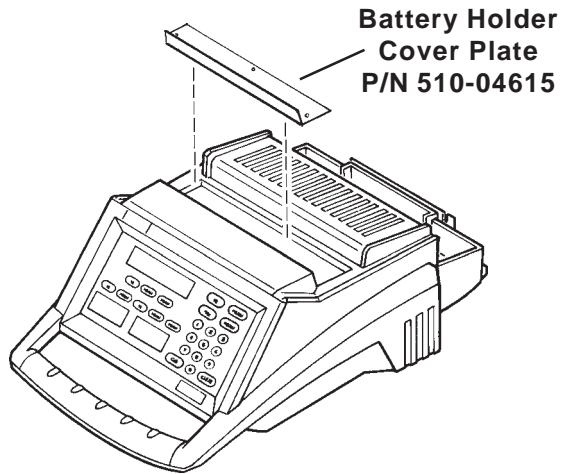
Negative (-) Lead

The negative lead has two circuits: battery load and volts.

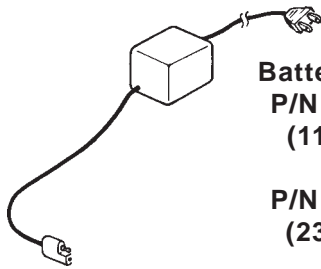
1. **Battery Load Circuit** - Put one ohmmeter lead on the exposed end of the cable, where it is bolted to the bottom of the tester. Put the other ohmmeter lead on the clamp's lower jaw (the jaw with the black boot on the handle). Ohms should read 0.0. If the meter reads more than 0.2 ohms, the lead should be replaced.
2. **Volts Circuit** - Attached to the bottom of the tester is a cable. A small wire coming out of the end of the negative cable plugs into a socket on the bottom of the tester. Remove this wire from its connector socket and connect one of the ohmmeter leads to it.

Connect the other ohmmeter lead to the upper jaw on the battery clamp. Ohms should read 0.0. When there is more than 0.1 ohms, the entire negative lead should be replaced.

Replacement Items



**Battery Holder
Cover Plate
P/N 510-04615**



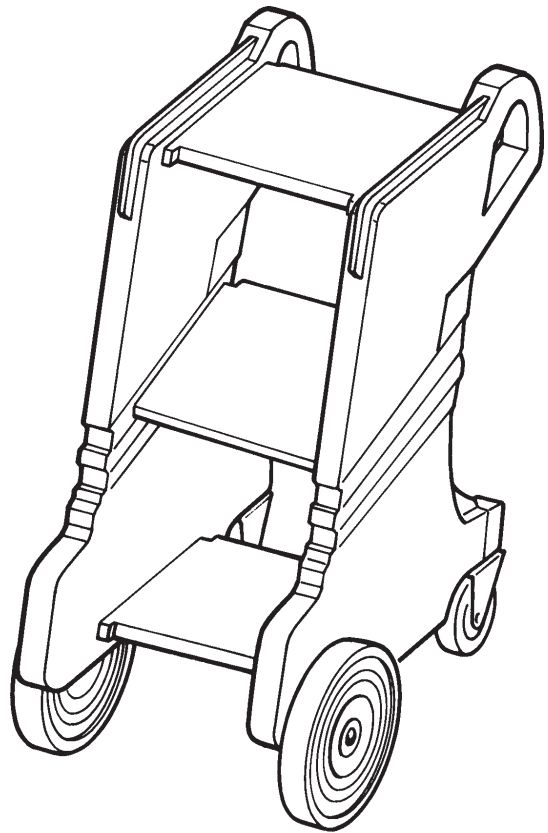
**Battery Charger
P/N 535-04680
(110V 60Hz)

P/N 535-06269
(230V 50Hz)**



**Internal Battery
P/N 535-05924**

Optional Items



**Roll-Around Stand
Model #B42-252 (unassembled)
Model #B42-253 (assembled)**

Bosch Automotive Service Solutions, LLC Limited Warranty

THIS WARRANTY IS EXPRESSLY LIMITED TO ORIGINAL RETAIL BUYERS OF BOSCH ELECTRONIC DIAGNOSTIC TOOLS (“UNITS”).

Bosch Units are warranted against defects in materials and workmanship for three years (36 months) from date of delivery. This warranty does not cover any Unit that has been abused, altered, used for a purpose other than that for which it was intended, or used in a manner inconsistent with instructions regarding use. The sole and exclusive remedy for any Unit found to be defective is repair or replacement, at the option of Bosch. In no event shall Bosch be liable for any direct, indirect, special, incidental or consequential damages (including lost profit) whether based on warranty, contract, tort or any other legal theory. The existence of a defect shall be determined by Bosch in accordance with procedures established by Bosch. No one is authorized to make any statement or representation altering the terms of this warranty.

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Replacement and optional parts can be ordered directly from your Bosch authorized tool supplier. Your order should include the following information:

- **Quantity**
- **Part number**
- **Item description**

Technical Service

If you have any questions on the operation of the product, please call (800) 533-6127.

Repair Service

When sending your Bosch electronic product in for repair, please include the following information:

- company name
- contact name
- telephone number
- description of the problem
- proof-of-purchase for warranty repairs
- preferred method of payment for non-warranty repairs

Payment can be made with Visa, Master Card or with approved credit terms. To receive a credit application, please fax your request to the Credit Department at 800-962-8734.

Send the unit to:
Bosch Automotive Service Solutions, LLC, Owatonna Facility
PO Box 994
2300 Park Drive, Owatonna, MN 55060-0994
Attn: Repair

9/15/00

Alternator, Regulator, Battery & Starter Tester Instruction Manual



Automotive Service Solutions, A UNIT OF BOSCH

655 Eisenhower Drive, Owatonna, MN 55060-0095
Phone: 507-455-7000, International Sales: 507-455-7223